2 March 1964

MEMORANDUM FOR: Chairman, Technical Development Committee

THROUGH : Executive Secretary, TDC

SUBJECT : Staff Study - Film Processor Development Program

1. PROBLEM:

To establish a processor development program, making use of the present HTA/5 processor on a GFE basis as a test vehicle, for specified investigations in a GFE portable clean-room environment, adequately equipped and manned to achieve conceptual and engineering advances in the art and technology of film processing.

2. FACTS:

a. For many years, continuous photographic processing machines have been designed and engineered in accordance with standard and conventional procedures, with no significant change in concept.

b. In all cases, film was transported by friction over a series of motor-driven rollers or belts. This method of drive has necessitated physical contact of both the emulsion and base of the film against a multitude of surfaces as it passed through the various solutions and the dryer.

c. Repeated contact with the surfaces of driven rollers has frequently caused damage to images on soft emulsion surfaces. The torque of the drive roller has produced a longitudinal image distortion of inconsistent magnitude for which corrective computation is difficult. Small particles of foreign matter from poorly filtered solutions and from unclean ambient air have adhered to film surfaces causing uncertainty and errors in analysis and interpretation. Until recently, these processing defects were of little or no importance. However, now that photographic exploitation has been developed to an exacting science involving identification and measurement of extremely minute targets, it has become imperative that a means be sought to eliminate film surface damage, image distortion and particle adhesion to the maximum extent possible.

3. DISCUSSION:

a. A basically new processor known as the HTA/5 was built in an effort to eliminate objectionable characteristics in existing equipment. It employed an entirely new concept of liquid and air bearing transport based on patents originated in Canada. The system employs no moving parts or rollers in the processing or drying stages but transports the film on cushions of liquid or air with no hard surface contact. Tests of the HTA/5 have proved the concept to be sound. In addition to the elimination of surface damage and dimensional distortion, the concept simplifies the equipment by elimination of many rollers, bearings, racks and other operating parts. Required maintenance is reduced. Development becomes accelerated by increased agitation inherent in the system.

b. In spite of the significant potential advantages of the liquid-air bearing concept, tests of the first prototype showed clearly that many features of the design are in need of improvement. However, so little is known about the fundamentals of the concept that major improvement in processor technology can only be gained by a concerted development effort in all aspects of this system.

c. It is proposed to support a development effort in a competent commercial establishment suitably outfitted and manned to provide empirical answers derived by scientific methods rather than by trial and error to the many unknowns relating to photographic processing concepts and equipment.

d. A major portion of the proposed program will be devoted to the liquid-air bearing concept because of its demonstrated ability to accomplish full processing with total avoidance of physical contact with film surfaces during the processing phases. Major emphasis will be devoted to design parameters and configuration of the liquid and air bearings because of their importance in the system. Other important aspects for study will include reliability, reduction of power requirements, reduction of size, number of components and plumbing, color development and controllable development. Proposed objectives of the program are attached hereto.

e. In modern concepts of achieving and maintaining maximal modulation transfer functions, it has been dramatically revealed that even quite small foreign particles from the atmosphere can seriously degrade images of high frequency. As a result, the need for extremely clean and rigidly controlled environmental conditions has become a requirement of major importance in every phase of film handling. The importance of a clean-room environment for film processing has been recognized throughout the intelligence community and has been adopted as standard practice by the SPPL at Westover Air Force Base and other laboratories.

f. It is proposed to place the contract with the [redacted] 25X1
5X1 [redacted] level-of-effort for a 12 month period. That company was chosen because the liquid-air bearing concept originated with them and the HTA/5 processor was produced by them. Further, that company has exhibited progressive originality in new processing techniques and concepts and has demonstrated superior and extensive capability in the areas of development and production of photographic processors.

5X1 g. Although the [redacted] has quite adequate floor space available to accommodate such a program, it does not, nor does any other firm, have a clean-room installation of the type required for proper accomplishment of this program. It is proposed to provide and install as GFE a complete and suitable clean-room of 1800 square feet at an estimated
5X1 total cost of [redacted] including all electrical, plumbing, heating, air conditioning and filtering fixtures. In order to avoid problems of security as well as delays in procurement, it is proposed to have [redacted] 25X
procure the clean-room and supervise its installation on a cost only basis. The clean-room should be procured from [redacted] 25X
on a sole source basis because they are the only known source with an experience precedent for this specialized application. The clean-room will be a stainless steel, portable and knock-down type that can at some future date be dismantled and moved for other uses.

4. CONCLUSIONS:

a. A development program directed towards improvement of processing techniques and equipment will produce significant advances in the general art and technology of processing.

b. Such a program must be conducted under proper clean-room environmental conditions. Since no such clean-room facility exists in industry, it must be provided.

c. The HTA/5 processor is a logical test vehicle for the program.

d. Conducting the development program in a clean-room enclosure at the [redacted] plant will provide an additional advantage with respect to security. In the past, all processor programs have been conducted within a very large production shop that allowed no opportunity for security of the item or personnel inspecting same.

e. The [redacted] is well qualified to perform the proposed development effort.

f. The clean-room enclosure should be procured by [redacted] to avoid security problems and procurement delays.

5. RECOMMENDATIONS:

a. That a contract for a processor component test program be awarded to the [redacted] level-of-effort for a 12 month period.

b. That the program be in accordance with the attached Development Objectives.

c. That [redacted] procure the clean-room enclosure from [redacted] on a cost only basis to the Government.

[redacted]
Development Branch, P&DS